

# SOME AUSTRALIAN WASPS OF THE GENERA ZOYPHIUM AND ARPACTUS.

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FAMILY CRABRONIDÆ.

SUBFAMILY PARANYSSONINÆ.

GENUS ZOYPHIUM Kohl.

The genus *Zoyphium* Kohl, based on a single species as recently as 1893, is now found to include a large number of Australian forms, presenting excellent specific characters. The following table separates those at present known, but it cannot be doubted that many others will be found when collectors in various parts of Australia interest themselves in these small wasps:—

Females	.. .. .	1.
Males	.. .. .	15.
Two cubital cells in anterior wings	.. .. . <i>frontale</i> Turner.	
Three cubital cells	.. .. .	1.
1. First abdominal segment with a tooth or tubercle on each side	.. .. .	2.
First segment without such teeth	.. .. .	3.
2. Clypeus with two small teeth on each side	.. .. . <i>sericeum</i> Kohl.	
Clypeus with one tooth on each side; first abdominal segment campanulate, not truncate, with a pair of basal keels, and a small tubercle on each side not far from base	.. .. . <i>flavofasciatum</i> Turner.	
3. Abdomen black in middle and pallid at either end, its basal segment very short and broad, abruptly truncate; clypeus without lateral teeth	<i>dipteroides</i> Turner.	
Abdomen red in middle	.. .. .	4.
Abdomen black, or with hind margins of segments more or less red	.. .. .	7.
4. First abdominal segment black, with red hind margin; pronotum black; clypeus cream-colour	.. .. . <i>ornatum</i> n. sp.	
First abdominal segment red	.. .. .	5.
5. Upper margin of pronotum yellow, scutellum and postscutellum mainly red	.. .. . <i>collare</i> n. sp.	
Pronotum black; scutellum and postscutellum without red	.. .. .	6.
Mesonotum dark blue	.. .. . <i>erythrosoma</i> Turner.	
Mesonotum black	.. .. . <i>splendidum</i> n. sp.	
7. Pronotum with an interrupted cream-coloured band above; mesonotum faintly brassy, very finely and closely punctured	.. .. . <i>funebre</i> Turner.	
Pronotum with upper margin wholly dark	.. .. .	8.
8. Antennæ red or pale brownish	.. .. .	9.
Antennæ wholly or mainly black	.. .. .	10.
9. Legs bright yellow	.. .. . <i>affine</i> n. sp.	
Legs pale ferruginous brown	.. .. . <i>Kohlîi</i> Turner.*	

\* In his key, Turner says that ♀ *kohlîi* has no clypeal teeth, but his descriptions indicate a single short tooth on each side.

10. Pronotum strongly emarginate in middle above .. .. .	11.
Pronotum not emarginate .. .. .	12.
11. Tibiæ entirely red .. .. .	<i>emarginatum</i> n. sp.
Tibiæ not red .. .. .	<i>nigrum</i> n. sp.
12. Legs mainly black, not red or yellow .. .. .	<i>argyreum</i> n. sp.
Legs red .. .. .	13.
13. Wings strongly dusky .. .. .	<i>fuscipenne</i> n. sp.
Wings clear hyaline .. .. .	14.
14. Face with golden hair .. .. .	<i>crassicornæ</i> Ckll.
Face without golden hair .. .. .	<i>iridipenne</i> Turner.
15. (Males) Abdomen red .. .. .	16.
Abdomen pallid, with a broad median black band .. .. .	<i>flavofasciatum</i> Turner.
Abdomen black, or with hind margins of segments red .. .. .	19.
16. Very small, about 4 mm. long; upper margin of pronotum reddened .. .. .	<i>pusillum</i> n. sp.
Much larger; upper margin of pronotum not reddened .. .. .	17.
17. Mesonotum dark-blue .. .. .	<i>erythrosoma</i> Turner.
Mesonotum black .. .. .	18.
18. First abdominal segment black, with hind margin red .. .. .	<i>ornatum</i> n. sp.
First abdominal segment red .. .. .	<i>splendidum</i> n. sp.
19. Mesonotum red .. .. .	<i>rufonigrum</i> Turner.
Mesonotum black .. .. .	20.
20. Pronotum strongly emarginate in middle above .. .. .	21.
Pronotum not emarginate .. .. .	22.
21. Tibiæ entirely red .. .. .	<i>emarginatum</i> n. sp.
Tibiæ not red .. .. .	<i>nigrum</i> n. sp.
22. Legs bright ferruginous .. .. .	<i>crassicornæ</i> Ckll.
Legs yellow .. .. .	23.
23. Front with silvery hair .. .. .	<i>affine</i> n. sp.
Front with golden hair .. .. .	<i>doddi</i> Turner.

*Z. rufipes* Rohwer is omitted, as it is a *Sericophorus*.

The material of this genus in the Queensland Museum shows uniformity in most structural characters. Where these are very close, as between *Z. emarginatum* and *Z. nigrum* or *Z. erythrosoma* and *Z. splendidum*, there are well marked colour differences by which the forms may be easily separated. Colour characters seem constant and may be used with more confidence in this genus than in some others of the Crabronidæ.

In most of the species where both sexes are known, the females possess two pairs of teeth on the apical margin of the clypeus, while they are absent in the males. Several species of which but one sex is known are in agreement and may be included eventually in the above group. A few species, however, show a different arrangement. *Z. flavofasciatum* has one pair in each sex; *Z. argyreum* has one pair in the female; *Z. dipteroides* is said to be without teeth in the females. In a few males there is a slight angulation on the clypeal margin, but this is not considered to be within the meaning of the term "tooth."

**ZOYPHIUM CRASSICORNE** Ckll.

Female. Length 6 mm.; differs from the male in the colour of the clypeus, the basal half of which is blackish, with a pale ferruginous band along the apical margin; the apical edge has two small dark-coloured teeth close together on each side.

*Hab.*—Brisbane (*Hacker*), October and February.

**ZOYPHIUM FLAVOFASCIATUM** Turn.

Female. This sex differs from the male in its larger size, length  $10\frac{1}{2}$  mm. exp. 19 mm. The pygidial area is triangular, narrowly rounded at the apex, and clothed with short, stout hairs. It corresponds to the male in colours and markings, also in possessing a single tooth on either side of the apical margin of the clypeus.

*Hab.*—Brisbane (*Hacker*), November.

**ZOYPHIUM EMARGINATUM** new species.

Female. Length 8 mm. Head and thorax finely punctured, the entire face covered with brilliant silver pubescence ending abruptly, with rounded outline, at sides, a little above level of antennæ, but in certain lights the front also appears silvery; ocelli inserted in slight depressions, the posterior pair twice as far from each other as from the eyes; antennæ clavate, the apical joint large, obliquely truncated, the truncation excavated; sides of prothorax rather depressed, the central part produced with a large triangular emargination in the middle; the apical edge of the clypeus has two small teeth on each side. Median segment with a short longitudinal carina which ends in a somewhat circular shining depression; basal area with diagonal striæ which are strongest at the base; the posterior truncation is very finely punctured, the sides with silver pruinose pubescence. Dorsal abdominal segments very finely punctate, clothed with fine golden pruinose pubescence, sides of first segment silvery, the ventral segments smooth, shining, with a few scattered punctures, the apical edges thinly ciliate. Pygidial area reddish, triangular, flattened dorsally and broadly rounded apically. Second submarginal cell pointed on the radial nervure, receiving the second recurrent nervure at one-third from the apex; first recurrent nervure received at about the same distance from the first submarginal cell; posterior tibiæ with fine, short spines on the outer edge.

Black, mandibles at base, the first to fourth joints of all tarsi very pale flavus; enlarged apical tarsal joints, tibiæ, apex of anterior femora, intermediate and posterior femora except at base, light ferruginous; undersides of apical antennal joints bright ferruginous; apical bands of abdominal segments, testaceous; tegulæ rufous; pulvilli black; wings hyaline, slightly dusky, noticeably so at apex; iridescent, nervures and stigma dark-brown.

Male. Length 6 mm. Apical edge of clypeus without teeth; the triangular emargination in the middle of prothorax as in the female; apex of the last abdominal segment with two small projections at the sides, narrowly emarginate in the middle.

*Hab.*—Brisbane (*Hacker*), September, October.

**ZOYPHIUM NIGRUM** new species.

Female. Length 6 mm. Clypeus transverse, convex in the middle, the apical margin with two teeth on each side; clypeus and the lower half of face clothed with silver pubescence; ocelli nearly twice as far from eyes as the diameter of one; antennæ clavate, the fourth and following joints broader than long; apical joint large, obliquely truncated and excavated, not nearly so massive as in *Z. emarginatum*. Prothorax rather produced in the centre where it is triangularly emarginate; thorax and scutellum finely punctured; median segment finely diagonally striated, with a short longitudinal carina which ends in a shining circular depression, short white pubescence at the sides of segment. Abdomen finely punctured, clothed with thin white pubescence, the apical segment triangular, more coarsely punctured and covered with short grey hair; second submarginal very narrow on the radial nervure, receiving the second recurrent nervure past the middle, the first recurrent nervure is received at about the same distance from the first transverso-cubital nervure as the second recurrent is to the second transverso-cubital nervure.

Black, base of mandibles, part of tubercles, tibial spines, second, third, and fourth tarsal joints sordid white; tegulæ, tibiæ, first and fifth tarsal joints fuscous; antennæ largely ferruginous beneath; wings hyaline, iridescent, faintly dusky apically, nervures and stigma fuscous.

Male. Length 5 mm. Apical margin of clypeus without teeth; apical abdominal segment triangular, narrowly rounded at apex.

*Hab.*—Brisbane (*Hacker*), October. Caloundra (*Hacker*), September, on tree-trunk.

**ZOYPHIUM ARGYREUM**, new species.

Female. Length  $4\frac{1}{2}$  mm. Clypeus transverse, the apical margin with one tooth on each side; face the same width on the vertex as on the clypeus, clothed with silver pubescence. Prothorax slightly produced in the middle, without an emargination, lined dorsally with silver pubescence. Mesonotum and scutellum finely punctured; median segment very finely diagonally striated, entirely clothed with silver pubescence, thickest at the sides; area with a longitudinal shining sulcus widened and rounded apically. Abdomen microscopically punctured and thinly clothed with whitish pubescence; pygidial area triangular, more coarsely punctured, and clothed with short dark hairs. Second recurrent nervure received about one-fifth from the base of the second submarginal cell; the first received at about an equal distance from the apex of the first submarginal cell.

Black, base of mandibles, the whole of the clypeus, underside of scape, tubercles, apex of anterior femora, anterior tibiæ, the spurs, and the tarsal joints sordid white. Mandibular teeth, a narrow line on the apical clypeal margin, tegulæ, an obscure apical band on first abdominal segment ferruginous, antennæ black, obscurely fulvous beneath; pulvilli black.

*Hab.*—Birkdale, near Brisbane (*Hacker*), February. At flowers of *Lomatia silaifolia* R.Br.



**ZOYPHIUM COLLARE**, new species.

Female. Length 8 mm. Head and thorax finely punctured; face narrower at vertex than at clypeus, clothed with silver pubescence which extends up the sides of the front; clypeus with two distinct teeth on each side; posterior ocelli closer to the eyes than the diameter of one; apical joint of antennæ not wider than the preceding joint; a deep foveolate groove at the base of the scutellum, anterior to which there is a transverse band of pale yellow pubescence; median segment finely punctate striate, with a shallow longitudinal sulcus containing a short carina; at its apical end there are a few transverse striæ in a depression surrounded by a kidney-shaped swelling. Abdomen finely punctured; apical segment with coarser punctures, and short reddish hair. Second submarginal cell pointed on the radial nervure, receiving the second recurrent nervure slightly beyond the middle.

Black, base of mandibles, clypeus, scape (except a pale red patch above) and thickened upper border of prothorax creamy-white; scutellum and post-scutellum rufescent; flagellum (except dusky apex), abdomen, femora, and tibiæ ferruginous; a large creamy-white shining space on apical part of anterior femora beneath; spurs whitish; tarsi pale reddish, with dark pulvilli; nervures and stigma fuscous.

*Hab.*—Birkdale, near Brisbane (*Hacker*), February. At flowers of *Lomatia silaifolia*.

**ZOYPHIUM ORNATUM**, new species.

Female. Length 8 mm. Face narrower at vertex than at clypeus, sides straight; clothed with silver pubescence; clypeus with two teeth on each side; posterior ocelli nearly twice as far from each other than from the eyes; apical joint of antennæ not wider than the preceding joint; mesonotum and scutellum opaque, finely and closely punctured; a deep foveolate transverse groove at the base of the scutellum with a little silver pubescence at each end; median segment dorsally diagonally striated, with a central longitudinal carina, which ends in a shallow shining sulcus; basal abdominal segments shining, minutely punctured; apical segments clothed with thin golden pubescence; pygidial area triangular, clothed with short hairs; second submarginal cell pointed on the radial nervure, receiving the second recurrent nervure well beyond the middle.

Black, base of mandibles, and clypeus creamy-white; scape and apex of femora, very extensive on anterior pair, pale yellow; tibiæ and tarsi pale reddish, the anterior tarsi with a yellow stripe; flagellum except dark apex, apical border of first, and all of the remaining abdominal segments ferruginous.

Male. Length 7 mm. Clypeus without teeth, black with a rather obscure yellow spot on each side near the middle; hypopygium ending in an acute spine, with an acute spine on either side; first abdominal segment, except the apical band, black, as in the female.

*Hab.*—Birkdale, near Brisbane (*Hacker*), February. At flowers of *Lomatia silaifolia*.

**ZOYPHIUM PUSILLUM**, new species.

Male. Length 4 mm. Clypeus wide, the margins somewhat sinuate, without teeth; face clothed with thin white pubescence; front rather prominent, convex, finely and closely punctured: joints of antennæ broader than long, the apical joint not wider than the preceding joint; ocelli not twice as far from each other than from the eyes; mesonotum and scutellum finely punctured; median segment finely diagonally striate-punctate with a longitudinal carina which ends in a shallow shining transverse crescent apically. Abdomen shining, minutely punctured, with thin pubescence on the apical segments; hypopygium truncate, with a small blunt apical spine, and one at each side near the apex. Second recurrent nervure received a little beyond the middle of the second submarginal cell, the first received a smaller distance from the apex of the first submarginal cell.

Black, base of mandibles, clypeus, and tarsal joints cream-colour, tegulæ testaceous; tubercles, upper border of prothorax, legs, and abdomen ferruginous; flagellum red, dusky above; wings hyaline, iridescent, slightly dusky apically, nervures brown.

*Hab.*—Brisbane (*Hacker*), October.

**ZOYPHIUM SPLENDIDUM**, new species.

Female. Length 9 mm. Head finely punctured, orbits converging above; ocelli half as far again from each other as from the eyes; joints of antennæ gradually increasing in size, apical joint conical, as long as the two previous joints; clypeus convex, porrect at the apex, with two teeth on each side; clypeus and face clothed with silver pubescence. Thorax opaque, very finely and closely punctured; prothorax rather narrow; depressed below the level of the mesonotum; a deep foveolate transverse groove at the base of the scutellum, and in front of it a line of white hair; median segment opaque with a few very short striæ at the base; a longitudinal carina lying in a shallow sulcus, extending to the end of the segment dorsally; the posterior truncation with thin white pubescence. Abdomen shining, microscopically punctured, the apical segments clothed with thin pale pubescence; the pygidial area triangular, with coarser punctures and short golden hair; second recurrent nervure received at rather more than one-third from the apex of the second submarginal cell, the first received a little further from the base of the first transverse cubital nervure.

Black, base of mandibles whitish; clypeus whitish in the centre, dusky at base and sides, scape dull yellowish-white; flagellum (somewhat darkened apically), entire abdomen, apex of femora, tibiæ, and tarsi ferruginous, the anterior tarsi paler; tegulæ and nervures fuscous.

Male. Length slightly over 6 mm. Clypeus black, apically porrect, armed with a stout spine; there is a short prominent keel above the antennæ; face clothed with short silver pubescence; hypopygium triangular, terminating in a spine, with a spine on either side near the apex. Scape darkly pallid at end.

*Hab.*—Brisbane (*Hacker*), February, March. On flowers of *Lomatia silaifolia*.

**ZOYPHIUM AFFINE**, new species.

Female. Length 6 mm. Clypeus transverse, rather narrow, the apical margin with two minute teeth on each side; the posterior ocelli a little nearer to the eyes than the diameter of one; face about two-thirds as wide at the vertex as at the clypeus, clothed with short silver pubescence, which also covers the front up to level of ocelli; mesonotum and scutellum subopaque, finely punctured; a deep transverse groove at the base of the scutellum; median segment with a central longitudinal carina lying in a shallow sulcus; area diagonally striated, the striæ most distinct on basal line and on the sides of sulcus; abdomen shining, microscopically punctured; pygidial area triangular, clothed with short black hair; intermediate and posterior tibiæ armed with a few short spines on the outer edge; second submarginal cell pointed on the radius, receiving the second recurrent nervure two-fifths from the apex; first recurrent nervure received at about the same distance from the apex of the first submarginal cell.

Black, base of mandibles, clypeus, scape, first joint of flagellum, and the anterior coxæ flavous; legs shining chrome-yellow; flagellum ferruginous; wings hyaline, iridescent, faintly dusky, nervures brown.

Male. Length 4 mm. Clypeus yellow, without teeth; face clothed with silver pubescence as in the female; hypopygium ferruginous, obtusely rounded at the apex, with an obtuse tubercle on each side.

*Hab.*—Brisbane (*Hacker*), February.

This species is very close structurally to *Z. crassicornis* Ckll., from which it may be separated by the silver (instead of golden) pubescence on face (golden in *crassicornis*), and the bright yellow clypeus in both sexes (pale ferruginous and dusky in *crassicornis*). It is also related to *Z. doddi* Turner.

**ZOYPHIUM FUSCIPENNE**, new species.

Female. Length about 7 mm. Closely related to *Z. iridipenne* Turner for which it was at first mistaken, but larger, and evidently distinct by the dusky, pale brown wings, those of *iridipenne* being clear. The stigma is dark-brown, while the nervures are pale-brown, not black. The second recurrent nervure is received at more than three-quarters from base of second submarginal cell. In other respects the insect agrees with Turner's description of *iridipenne*, but it should be stated that the abdomen is dusky red at apex, and the flagellum is brown beneath. The silvery hair on face and lower part of front is thin and not brilliant, its outline on the front is in the form of a very broad V.

*Hab.*—Wedge Island, Tasmania, 4-1-1914 (*G. H. Hardy*).

## SUBFAMILY ARPACTINÆ.

**ARPACTUS CRUCIGERA**, new species.

Female. Length 9 mm. Head, thorax, and abdomen finely and closely punctured; eyes not convergent towards the clypeus; posterior ocelli a little further from each other than from the eyes; front and sides of face clothed with

short golden hair; clypeus transverse, shallowly emarginate at the base, more sparsely punctured than the rest of the head, a transverse sulcus at the base of the scutellum coarsely longitudinally striated; scutellum large, oblong, the basal and apical sides parallel, finely punctured except a small bare part in the centre; basal area of median segment with coarse longitudinal striæ, which are slightly deflected at the boundary, but continue over the dorsal surface; sides of median segment with longitudinal striæ. First abdominal segment narrowed at the base, slightly constricted at the apex, and rather coarsely punctured, the third, fourth, and fifth segments clothed with light pubescence; pygidial area triangular, shining, and sparsely punctured. Fore tarsi with short weak cilia, intermediate tibiæ with two equal apical spines, hind tibiæ with a few minute spines. First, second, and third abscissæ of the radius of equal length.

Black; the two basal joints of the antennæ, clypeus, labrum, mandibles at base, broad upper margin of prothorax, tubercles, large wedge-shaped area on pleura, and a stripe on each side on the mesonotum, yellow; scutellum yellow at sides, leaving a large black triangle in the middle; postscutellum yellow with a black triangular mark in the centre, and separated from the median segment by a black line; the basal area is yellow very distinctly outlined on the sides with a black line, a central black stripe commencing at the postscutellum passes through the basal area and continues to the end of the median segment; this stripe and the line between the postscutellum and the basal area make a conspicuous black cross; sides of median segment yellow; the apical half and sides of first abdominal segment, apical margins of the remaining segments (narrowest on the second) yellow; antennæ and pygidial area ferruginous; the outer sides of anterior and intermediate tibiæ and tarsi yellow; the inner sides and the posterior legs ferruginous. Wings brownish hyaline, the radial all brown, stigma ferruginous, nervures dilute fuscous, tegulæ testaceous.

The venation resembles that of *A. rufomixtus* Turner, but the second recurrent nervure bulges more outwardly. The basal nervure meets the nervulus.

*Hab.*—Brisbane (*Hacker*), November.

#### ARPACTUS RUFOMIXTUS Turn.

Male. Length 7 mm. The underside of the scape is yellow, the clypeus is yellow with a narrow testaceous line on the apical edge; the face below insertion of antennæ is clothed with light silky hair; other markings as in the female.

*Hab.*—Enoggera, near Brisbane (*Hacker*). Both sexes bred from oval cocoons which were dug out of a sandy bank. This sex has not previously been described.

The use of *Arpactus* for these insects depends on the acceptance of the "Erlangen list." For the present we follow the usage of Turner, who revised the Australian species. The other alternative, following the laws of priority, would be according to Morice and Durrant *Ceropales* Latrielle, which is current for quite a different sort of insect, but Rohwer maintains *Ceropales* in the usual sense (*J. Ac.*, Washington, vol. 10, p. 176).